No. 200300192

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

NDSU Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

OAT

'Morton'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this twenty-first day of March, in the year two thousand and five.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
NDSU Research Foundation

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
ND941119

3. VARIETY NAME
'Morton'

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
C/O Executive Director
PO Box 5002
1735 NDSU Research Park Drive
Fargo, ND 58105-5002

5. TELEPHONE *(include area code)*
(701) 231-8931

6. FAX *(include area code)*
(701) 231-6661

FOR OFFICIAL USE ONLY

PVPO NUMBER
200300192

FILING DATE
March 21, 2003

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
501 (C) 3

8. IF INCORPORATED, GIVE STATE OF INCORPORATION
North Dakota

9. DATE OF INCORPORATION
May, 1989

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*

Michael McMullen
Department of Plant Sciences
North Dakota State University
Fargo, ND 58105-5051

Dale Zetocha
NDSU Research Foundation
PO Box 5002
1735 NDSU Research Park Drive
Fargo, ND 58105-5002

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ 3652.00
DATE 3/21/2003

CERTIFICATION FEE:
$ 432.00
DATE 12/06/2004

11. TELEPHONE *(include area code)*
(701) 231-8165

12. FAX *(include area code)*
(701) 231-8474

13. E-MAIL
michael.mcmullen@ndsu.nodak.edu
dale.zetocha@ndsu.nodak.edu

14. CROP KIND *(Common Name)*
Oats

15. GENUS AND SPECIES NAME OF CROP
Avena sativa

16. FAMILY NAME *(Botanical)*
Gramineae, Aveneae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☑ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED
(Follow instructions on reverse)

a. ☑ Exhibit A. Origin and Breeding History of the Variety
b. ☑ Exhibit B. Statement of Distinctness
c. ☑ Exhibit C. Objective Description of Variety
d. ☑ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☑ Exhibit E. Statement of the Basis of the Owner's Ownership
f. ☑ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
g. ☑ Filing and Examination Fee ($3,652), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☐ YES *(If "yes", answer items 20 and 21 below)* ☑ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☐ YES ☐ NO
IF YES, WHICH CLASSES? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☑ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☑ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER
Dale Zetocha

NAME *(Please print or type)*
Dale Zetocha

CAPACITY OR TITLE
Executive Director
NDSU Research Foundation

DATE
3/20/03

SIGNATURE OF OWNER

NAME *(Please print or type)*

CAPACITY OR TITLE

DATE

ST-470 (02-10-2003) designed by the Plant Variety Protection Office using Word 2000. Replaces former versions of ST-470, which are obsolete.

(See reverse for instructions and information collection burden statement)

200300192

INSTRUCTIONS

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $3,652-($432 filing fee and $3,220 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

Date of first distribution to North Dakota Crop Improvement Association in the US: April 5, 2002

23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed.htm

ST-470 (02-10-2003) designed by the Plant Variety Protection Office with Word 2000. Replaces former versions of ST-470, which are obsolete.

18 a. Exhibit A. Origin and Breeding History of 'Morton'

Pedigree

ND880922/IA B605X

IA B605X = Breeding line from Iowa State University entered in the 1990 Uniform Midseason Oat Performance Nursery (UMOPN). IA B605 is a heterogeneous bulk that was mass-selected for simply inherited traits and was developed from crosses involving multilines 'E70' and M70'.

ND880922 = ND830775/'Riel'

ND830775 = RPB120-73/RL3038//Noble/3/'Otter'/'Diana'/ /RL3038/'Dal'

RPB120-73 = A breeding line of unknown parentage from David Thompson of Rothwell Plant Breeders, J. Nickerson Res. Ctr., Rothwell, Lincoln, England.

RL3038 is a breeding line received from R. McKenzie (Agric. & Agri-Food Canada Res. Stn., Winnipeg, MB. RL3038 has a complex pedigree that includes 'Rodney' and 'Pendek' and possesses genes *Pc-38, Pc-39, Pg-2,* and *Pg-13*.

Experimental Designation ND941119

Breeding Method --

Modified single seed descent and pedigree method

18 a. Exhibit A. Origin and Breeding History of 'Morton'

Details of subsequent stages of selection and multiplication including ***selection criteria***

Selection and Multiplication –	**Stage of development**	**Selection Criteria**
1990 Fall greenhouse	Final cross	
1991 Spring greenhouse	F_1	F_1 plants were uniform and seed from 6 plants was bulked to produce F_2 seed population
1991 Summer Field	F_2 selection of single panicle	F_2 population was segregating for crown rust and stem rust resistance in the field. Individual plants resistant to both crown rust and stem rust were selected for advancement.
1991 Fall greenhouse	F_3 single seed descent accompanied by screening for seedling resistance to critical races of stem rust and crown rust.	Seedlings were inoculated with composite of crown rust races that were avirulent on resistance derived from IA B605X and with stem rust race NA27. Seedlings exhibiting a resistant infection type were grown to maturity and seed from individual resistant F_3 plants were advanced to the field.
1992 Field	F_4 planted in hill plots from seed of single $F_{3:4}$ panicle. F_4 panicles harvested from selected hill plots	Panicles from plants in hill plots exhibiting stem rust and crown rust resistance along with resistance to lodging and tolerance to barley yellow dwarf virus were were harvested to provide seed for advancement to the F_5.

18 a. Exhibit A. Origin and Breeding History of 'Morton'

Selection and Multiplication –	Stage of development	Selection Criteria
1993 Field	Seed from F_4 panicle planted to produce paired hill plots. Selected paired hill plot harvested to produce $F_{4:5}$ breeding line that became the source of Morton breeder's seed.	Hill plots exhibiting homogeneity of crown rust and stem rust resistance were selected for harvest. Lodging resistance, white hull color, and visual selection of kernel morphology were considered to further select plots that were identified for harvest. Lines were evaluated as seedlings in the greenhouse using stem rust race NA27 and a composite of crown rust races to identify lines homogeneous for resistance to these diseases.
1994 Field - Fargo	F_6 Preliminary screening trial – Unreplicated trial with repeating checks for purposes of comparison. 4-row plots.	Selection was based on lodging resistance, medium heading date, high grain yield, high test weight, high groat percentage, kernel morphology, and resistance to stem and crown rust in the field. Stem rust and crown rust seedling resistance evaluation was repeated in the greenhouse. The experimental designation ND941119 was assigned from this trial.

18 a. Exhibit A. Origin and Breeding History of 'Morton'

Selection and Multiplication –	**Stage of development**	**Selection Criteria**
1995 – Field, Fargo and Casselton	F_7 Preliminary yield trial – two locations, two replications	Selection was based on lodging resistance, medium heading date, high grain yield, high test weight, high groat percentage, and resistance to stem and crown rust in the field. Groat protein and lipid concentration evaluated. Stem rust and crown rust seedling resistance evaluation was repeated in the greenhouse.
1996 – Four locations Fargo, Casselton, Edgeley, Carrington	F_8 Early advanced yield trial Four locations with 3 replications per location.	Selection was based on lodging resistance, medium heading date, stable high grain yield over locations, stable high test weight, high groat percentage, and resistance to stem and crown rust in the field. Groat protein and lipid concentration evaluated. Stem rust and crown rust seedling resistance evaluation was repeated in the greenhouse.
1997 Field 4 ND locations 3 SD locations 3 MN locations	F_9 Tri-State Oat Nursery Replicated trials at 10 locations Increase plot rougued of tall variants to initiate production of breeder seed	Evaluation was based on lodging resistance, medium heading date, stable high grain yield, stable high test weight, high groat percentage, and resistance to stem and crown rust in the field. Low groat lipid concentration identified. Stem rust and crown rust seedling resistance was evaluated in the greenhouse.

18 a. Exhibit A. Origin and Breeding History of 'Morton'

Selection and Multiplication –	**Stage of development**	**Selection Criteria**
1998 Field	F_{10} - North Dakota Oat Variety Trials at ten locations (NDOVT) and Uniform Midseason Oat Performance Nursery (UMOPN) at 20 locations. Increase plot evaluated for homogeneity and variants were removed.	ND941119 that became Morton was determined to produce high grain yield, high test weight, groat lipid concentration, and white hull color. Stem rust and crown rust resistance was evaluated at many locations and ND941119 was identified to have stable crown rust resistance and resistance to stem rust race NA27. Stem rust and crown rust seedling resistance evaluation was repeated in the greenhouse.
1999 Field	F_{11} North Dakota Oat Variety Trials at ten locations (NDOVT). Increase plot evaluated for homogeneity and variants were removed.	Evaluation continued for all characteristics evaluated in 2000
2000 ND Field	F_{12} NDOVT at 10 locations and Preliminary increase by Foundation Seed Stocks Project	Evaluation continued for all characteristics evaluated in 2000
2001 Field	F_{13} NDOVT at 10 locations Large increase by Foundation Seed Stocks	Evaluation continued for all characteristics evaluated in 2000
2001	Distribution of Foundation Seed and release as cultivar	

18 a. Exhibit A. Origin and Breeding History of 'Morton'

Evidence of uniformity and stability:

Morton has been observed to be uniform and stable for stem rust resistance and crown rust resistance for eight generations from the original $F_{4:5}$ that was designated ND941119 in 1994 until release in 2001. Morton has been observed to produce up to 6% variant kernels in some environments that are nonfluorescent under irradiation with a UV light source. Varying frequencies of plants will produce weak awns in some environments.

The weak awns are usually more prevalent on florets of late tillers than on primary tillers. The presence and frequency of weak awns is dependent upon the environment in which Morton is grown. The frequency of these kernel and awn variants has not changed for five generations with observations at many locations since they were observed in the F_9 generation in 1997. Morton appears otherwise uniform and stable.

The type and frequency of variants during reproduction and multiplication and how these variants may be identified:

Lemma and palea are white and 94% of lemmas are fluorescent under irradiation with a UV light source while approximately 6% are weakly fluorescent or non-fluorescent. Awns are normally absent, but weak awns may occur under some environmental conditions. During selection and development of Morton, a small portion of plants was observed that produce weak awns. These naturally occurring weak-awn variants may be present on nearly all tillers under some environmental conditions, while in other environments the weak awns will be completely absent or present only on late tillers.

18B. Exhibit B. Novelty Statement.

'Morton' is a spring oat that is most similar to 'Otana' in appearance. Morton is resistant to all races of crown rust present in North Dakota, while Otana is considered universally susceptible to crown rust. Morton possesses crown rust resistance derived from IA B605X (temporary designation of resistance gene is Pc-IAB) that confers resistance to all races of crown rust prevalent in North Dakota as indicated by field reactions and by seedling reaction (Exhibit D, Table 4) to a composite (NDCRC01) of isolates collected in the field in North Dakota for the past ten years. Otana lacks Pc-IAB. In contrast to Morton, Otana crown rust reactions in the field were 100S and seedling infection types (IT) were IT 4. Morton also possesses resistance to stem rust race NA27 conferred by *Pg-13* that produces an IT 2 when seedlings are inoculated with this race (Exhibit D, Table 5). Resistance to stem rust race NA27 conferred by *Pg-13* distinguishes Morton from other USA cultivars that are resistant to NDCRC01 with the exception of TAM O386 that is a winter oat. Otana lacks *Pg-13* and is susceptible to stem rust race NA27. Morton possesses crown rust resistance gene Pc-IAB that confers a fleck (;) seedling IT after inoculation with crown rust isolate R230 (Exhibit D, Table 7). This is different from 'HiFi' which lacks Pc-IAB and produces seedling IT 2 after inoculation with R230R230 is avirulent on Pc-IAB and virulent on the crown rust resistance gene *Pc-91* that provides crown rust resistance in HiFi.

A search of the *Oat* database identified 'Steele' that could not be distinguished from Morton from information in the database. Steele possesses the crown rust resistance genes *Pc-38* and *Pc-39,* the same gene combination that occur in 'Jerry' and 'Whitestone'. Cultivars with only the *Pc-38 Pc-39* gene combination are susceptible to NDCRC01 (Exhibit D, Table 4). The presence of Pc-IAB in Morton distinguishes Morton from Steele which lacks Pc-IAB.

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
[redacted]
BELTSVILLE, MARYLAND 20705

FORM APPROVED: OMB NO. 40-R3712

EXHIBIT (Oat)

OBJECTIVE DESCRIPTION OF VARIETY
OAT
(Avena spp.)

NAME OF APPLICANT(S)	VARIETY NAME OR TEMPORARY DESIGNATION
Michael S. McMullen	Morton
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code)	FOR OFFICIAL USE ONLY
Department of Plant Sciences, NDSU Fargo, ND 58105-5051	PVPO NUMBER 200300192

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less.

1. SPECIES:

[1] 1 = SATIVA 2 = BYZANTINA 3 = OTHER (Specify) _____

2. GROWTH HABIT:

[3] 1 = WINTER 2 = SEMIWINTER 3 = SPRING

[3] JUVENILE GROWTH: 1 = PROSTRATE 2 = SEMIPROSTRATE 3 = ERECT

STANDARD VARIETIES

1 = JAYCEE 2 = CLINTLAND 64 3 = CAYUSE 4 = NORLINE 5 = YANCEY 6 = FLORIDA 501

3. MATURITY (50% flowering):

[ ][ ] DAYS EARLIER THAN . . . . [ ] STANDARD VARIETY

[ ][4] DAYS LATER THAN . . . . [2] STANDARD VARIETY

[4] Season: 1 = VERY EARLY (Jaycee) 2 = EARLY (Nodaway 70) 3 = MIDSEASON (Clintford)
4 = LATE (Lodi) 5 = VERY LATE (Garry) 6 = EXTREMELY LATE (Mackinaw)

4. PLANT HEIGHT (From soil level to top of head):

[1][0][5] CM. TALL

[ ][ ] CM. SHORTER THAN . . . . [ ] STANDARD VARIETY

[1][0] CM. TALLER THAN . . . . [2] STANDARD VARIETY

5. STEM:

[2] DIAMETER: 1 = FINE (Kherson) 2 = MEDIUM (Clintford) 3 = COARSE (Nodaway 70)

[1] HAIRINESS AT UPPER CULM NODES: 1 = HAIRLESS 2 = HAIRY

[1] MATURE STEM COLOR: 1 = YELLOW 2 = REDDISH

6. LEAF: (Leaf Color: The Royal Horticultural Society's or any recognized color chart should be used to determine the leaf color of the described variety.)

[1] CARRIAGE: 1 = DROOPING (Random) 2 = ERECT (Walken)

[3] COLOR: 1 = YELLOW GREEN 2 = LT. GREEN 3 = DK. GREEN 4 = BLUE GREEN

[1][7] MM. WIDTH (First leaf below flag leaf)

[2] LIGULE: 1 = ABSENT 2 = PRESENT

[1] LEAF MARGIN: 1 = GLABROUS 2 = CILIATE

[1] LEAF SHEATH: 1 = HAIRLESS 2 = HAIRY

7. HEAD:

[1] PANICLE SHAPE: 1 = EQUILATERAL 2 = INTERMEDIATE 3 = SIDE PANICLE (Unilateral)

[1] ATTACHMENT OF LOWER WHORL OF BRANCHES: 1 = FIRST NODE 2 = SECOND NODE (False node)

[2] PANICLE SIZE: 1 = SMALL (Yancey) 2 = MEDIUM (Walken) 3 = LARGE (Markton)

[1] PANICLE WIDTH: 1 = NARROW (Gopher) 2 = MIDBROAD (Yancey) 3 = BROAD (Nodaway 70)

[2][2] CM. PANICLE LENGTH [1][5] NUMBER OF BRANCHES [ ][5] NUMBER OF WHORLS OF BRANCHES

[1] POSITION OF BRANCHES: 1 = ASCENDING (Yancey) 2 = SPREADING (Cayuse) 3 = DROOPING (Markton)
4 = PECTINATE (White Tartar) 5 = CONFUSED (Storm King)

10

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8. RACHIS:

[2] 1 = RECURVED (Yancey) 2 = ERECT (Walken)

[2 1] MM. SECOND FLORET RACHILLA SEGMENT LENGTH

[1] SECOND FLORET RACHILLA SEGMENT: 1 = HAIRLESS 2 = HAIRY

[ ] RACHILLA HAIRS: 1 = SHORT 2 = LONG

9. SPIKELET:

[3] SPIKELET SEPARATION BY: 1 = ABSCISSION 2 = SEMIABSCISSION 3 = FRACTURE

[2] FLORET SEPARATION BY: 1 = DISARTICULATION 2 = HETEROFRACTURE 3 = BASIFRACTURE

[1 9] FLORETS PER SPIKELET (mean no.)

10. GLUMES: (Glume Color: The Royal Horticultural Society's or any recognized color chart should be used to determine the color of the described varie

[0 7] MM. WIDTH [2 1] MM. LENGTH [0 7] NO. OF VEINS ON GLUMES [1] COLOR: 1 = WHITE 2 = YELLOW 3 = RED 4 = STRIPED

11. LEMMA: (Lemma Color: The Royal Horticultural Society's or any recognized color chart should be used to determine the color of the described varie

[1 4] MM. LENGTH

[1] COLOR: 1 = WHITE 2 = YELLOW 3 = RED 4 = GRAY 5 = BLACK

[1] HAIRINESS OF DORSAL SURFACE: 1 = HAIRLESS 2 = HAIRY

12. AWN (First floret):

[2] OCCURENCE: 1 = ABSENT (Walken) 2 = INFREQUENT (Yancey) 3 = COMMON (Chilocco) 4 = FREQUENT (Random)

[1] TYPE: 1 = NON-TWISTED 2 = TWISTED 3 = TWISTED GENICULATE

[2 5] MM. AWN LENGTH

13. SEED:

[1] FLORESCENCE UNDER ULTRAVIOLET LIGHT: 1 = FLORESCENT 2 = NON-FLORESCENT

[1] BASAL HAIR: 1 = ABSENT (Florida 501) 2 = ABSENT TO FEW (Yancey) 3 = FEW TO SEVERAL (Lee) 4 = SEVERAL TO NUMEROUS (Florilee) 5 = NUMEROUS (Red Rustproof)

[ ] MM. BASAL HAIR LENGTH

[3 6 1] GMS. PER 1,000 SEEDS

[2 6] MG. GROAT WEIGHT (each)

[1 6 6] % GROAT PROTEIN

[0 5 0] % GROAT OIL

14. INSECTS: (0 = NOT TESTED, 1 = SUSCEPTIBLE, 2 = RESISTANT)

[0] CEREAL LEAF BEETLE [0] BLUEGRASS BILLBUG [0] GRAIN BUG (C. Sayi) [0] NEMATODE (Type)_____

[0] GREEN BUG (Biotype)_____ OTHER (Specify)_____

15. DISEASE: (0 = NOT TESTED, 1 = SUSCEPTIBLE, 2 = RESISTANT)

[0] HALO BLIGHT [0] POWDERY MILDEW [0] SEPTORIA LEAF BLOTCH [0] SOIL-BORNE MOSIAC

[0] HELMINTHOSPORIUM LEAF BLOTCH [1] YELLOW DWARF VIRUS [0] VICTORIA BLIGHT [ ] OTHER (Specify)_____

SPECIFY RACES TESTED:

		RACES SUSCEPTIBLE	RACES RESISTANT
[2]	CROWN RUST		CR13,CR181,CR185,CR192,CR223,CR22
[2]	STEM RUST	NA67	NA8,NA16,NA27,NA28,NA55
[0]	COVERED SMUT		
[2]	LOOSE SMUT		

16. INDICATE VARIETY YOU BELIEVE MOST CLOSELY TO RESEMBLE THAT SUBMITTED:

CHARACTER	VARIETY	CHARACTER	VARIETY
PLANT TILLERING	Otana	LEAF COLOR	Jerry
LEAF SIZE	Otana	LEAF CARRIAGE	Otana
SEED COLOR	Jerry	SEED SHAPE	Otana

COMMENTS:

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Exhibit D. Additional Description of the Variety

'Morton' spring oat was developed from the cross ND880922/IA B605X and designated ND941119 during development at North Dakota State University. Morton has been evaluated in replicated trials in North Dakota since 1995. During three years of evaluation in North Dakota Oat Variety trials that include 29 location/years, it has exhibited high grain yield potential equivalent to 'AC Assiniboia' and consistently produced higher test weight grain than any cultivar tested with the exception of 'Hytest' (Table 1).

The average groat percentage of Morton is improved relative to 'Jerry', but is not as high as AC Assiniboia (Table 2). Morton produces kernels that are uniform in size with very few kernels that were small enough to pass through a 5/64" slotted sieve. Morton produced medium whole oat protein concentration similar to 'Jerry'.

Morton heads about 1 day later than 'Killdeer'and is medium maturity (Table3). Although Morton is relatively tall, it has excellent straw strength and greater lodging resistance than any cultivar evaluated in the same trials.

Morton exhibited excellent resistance to crown rust (incited by *Puccinia coronata* Cda. f. sp. *avenae* Eriks.) and has good resistance to the prevalent races of stem rust (incited by *Puccinia graminis* Pers.: Pers. f. sp. *avenae* Eriks. & E. Henn.) (Table 4 and 5), but is susceptible to NA67, a new virulent stem rust race recently observed in the northern plains area.

Morton has low groat oil concentration (slightly lower than Jerry) (Table 6). Low groat oil concentration is desirable for the food milling industry. The groat Beta-glucan content of Morton is similar to AC Assiniboia.

Culms and leaf margins of Morton are glabrous and ligules are present. It has equilateral panicles with ascending branches. Spikelet separation occurs by fracture and floret separation by heterofracture. Lemmas are glabrous and basal hairs are absent. Kernels of Morton are medium to large and midplump. Lemma and palea are white and 95% of lemmas are fluorescent under irradiation with a UV light source. Awns are normally absent, but weak awns may occur under some environmental conditions.

Morton should provide growers with a disease resistant, high yielding, white hull cultivar that will produce test weights that are consistently high enough for premium oat markets. It has very good disease resistance and excellent straw strength allowing production under conditions of high moisture and high fertility. Morton exhibited a 15% yield advantage and 1 lb./bu. test weight advantage relative to Jerry (Table 1). The higher test weight and increased kernel size of Morton relative to Jerry increase the probability of utilizing premium oat markets to increase the value of the crop.

Exhibit D. Additional Description of the Variety

Table 1. Comparison of grain yield and test weight of Morton with selected genotypes in 1998-2000 North Dakota Oat Variety Trials.

Genotype	Grain Yield		Test Weight	
	1999-2000 2 yr Mean	1998-2000 3 yr Mean	1999-2000 2 yr Mean	1998-2000 3 yr Mean
	----bushels/acre---		--- lb./bushel ---	
AC Assiniboia	118.2	120.6	36.2	36.1
Brawn	115.5	117.5	34.9	34.9
Ebeltoft	127.3	126.6	35.3	35.1
Hytest	86.9	89.7	39.0	39.0
Jerry	106.1	105.7	37.1	37.0
Jud	114.8	114.9	36.0	36.1
Killdeer	125.9	128.4	35.5	35.4
AC Medallion	112.2	113.0	35.6	35.3
Otana	93.1	90.0	32.5	32.3
Paul	85.5	87.0	41.7	41.9
Troy	108.3	109.0	36.0	36.1
Whitestone	108.1	109.0	32.7	32.8
Youngs	117.5	119.0	34.1	34.4
HiFi	123.0		36.6	
Morton	**117.9**	**121.0**	**38.0**	**37.8**
Loc. Yrs.	20	29	20	29

Table 2. Comparison grain quality characteristics of Morton with selected genetypes in the 1998-2000 North Dakota Oat Variety Trials.

Genotype	Groat Percentage		% kernels over 5/64" sieve 2000	Whole Oat Protein Concentration	
	1999-2000 2 yr Mean	1998-2000 3 yr Mean		99-00 2 yr Mean	98-00 3 yr Mean
				----- g kg^{-1} -----	
AC Assiniboia	76.2	76.0	95.8	142	137
Brawn	74.0	73.9	94.6	137	132
Ebeltoft	72.8	72.4	93.3	138	135
Hytest	74.9	74.8	94.5	159	159
Jerry	72.5	72.1	91.9	150	144
Jud	72.8	72.8	82.7	144	143
Killdeer	72.8	72.7	92.8	124	122
AC Medallion	73.7	73.4	94.1	133	129
Otana	66.3	66.3	86.0	166	151
Paul	92.5	92.7	55.6	175	179
Troy	72.2	72.0	86.3	136	138
Whitestone	66.8	66.9	85.4	132	127
Youngs	73.0	73.0	94.7	148	144
HiFi	73.2		89.0	162	
Morton	73.7	73.5	94.4	146	145
Loc. Yrs.	17	25	9	16	25

Exhibit D. Additional Description of the Variety

Table 3. Comparison of heading date, plant height, and lodging score of Morton with selected genotypes in variety trials at Fargo in 1998-2000.

Genotype	Days to Head > May 31	Plant Height (cm)	Lodging Score 1998	1999	2000	1998-2000
			---------- 0-5 ----------			
AC Assiniboia	34.9	108	3.3	1	1.5	1.9
Brawn	31.0	97	1.9	1.4	2.5	1.9
Ebeltoft	34.8	101	3	2.3	2.5	2.6
Hytest	26.5	113	3.3	2.6	2.2	2.7
Jerry	27.3	109	2.6	1.5	1	1.7
Jud	31.6	114	3.2	3	3.9	3.4
Killdeer	29.3	96	2	0.9	2.9	1.9
AC Medallion	32.8	111	4.2	2.9	3.6	3.6
Otana	31.9	111	4	2.3	4.5	3.6
Paul	32.5	114	2.6	1.6	1.8	2.0
Troy	31.1	111	3.4	2.1	3.3	2.9
Whitestone	32.1	102	2.8	1	4.3	2.7
Youngs	32.1	115	3.3	1	2.7	2.3
HiFi	31.2	108	1.6	0.7	1.1	1.1
Morton	**30.4**	**119**	**1.8**	**1**	**0.7**	**1.2**
Loc./Yr.	3	3				3
Exp. Mean			2.7	1.5	2.2	
C.V.			21	37.9	29.8	
LSD .05			0.9	0.9	1	

Table 4. Comparison of of Morton with selected oat genotypes for field crown rust reaction and greenhouse seedling infection type .

Genotype	Crown Rust Field Reaction Yield Plot 1998	1999	2000	Hill Plot 1999	Crown Rust Seedling IT[a] 1999	2000
AC Assiniboia	TR	0R	OR	0R	;	;
Brawn	10MR	40S	60MS	40MS	4	3
Ebeltoft	TMR	10MR	20MR-MS	10MR	3	;/3-3?
Hytest	5MR	40MS	40MS	60S	4	3
Jerry	10MR-MS	20MS	60MS	40MS	4	3
Jud	5MR	TMS	5MR-MS	TMS	4	3
Killdeer	10MR	20MR	40MR-MS	10MR-MS	3	3
AC Medallion	0R	0R	OR	0R	;	;
Otana	100S	100S	100S	100S	4	3
Paul	TMR	20R	10MR-MS	10MR	4	4
Troy	20MS	40S	60S	40MS	2	3
Whitestone	40MS	40MS	80S	40MS	4	4
Youngs	5MR	20MR-MS	40MR-MS	20MR-MS	23	4
HiFi	TR	0R	OR	0R	;	;
Morton	TR	0R	OR	0R	;	;

[a] Seedlings inoculated with composite of isolates collected in the field and scored according to IT defined by Murphy (1935).

Exhibit D. Additional Description of the Variety

Table 5. Comparison of Morton with selected oat genotypes for field stem rust reaction and greenhouse seedling infection type .

Genotype	Field Reaction	Seedling IT[1]
AC Assiniboia	R	2
Belle	S	4
Brawn	S	4
Ebeltoft	R	2
Hytest	S	4
Jerry	R	2
Jud	MR α	2
Killdeer	R	2
AC Medallion	MR	2
Otana	S	4
Paul	MR α	2
Troy	S	4
Whitestone	R	2
Youngs	MR	2
HiFi	MR	1
Morton	**R**	**2**

[1] Infection type (IT) after inoculation with stem rust race NA27 according to IT definitions of Stakman et al. (1962).

Table 6. Quality characteristics of Morton as compared to ten current oat cultivars adapted to the region. Values are the means of values determined in 1997, 1998 and 1999 at the Fargo location.

	Kernel Weight	Groat Protein	Groat Oil	Groat β-Glucan
	mg	% dry	% dry	% dry
AC Assiniboia	31.0	18.3	7.35	4.98
AC Medallion	25.9	18.7	7.71	5.13
Belle	27.3	16.2	7.97	5.13
CDC Boyer	32.8	17.8	6.75	5.13
Gem	32.4	19.7	5.54	5.41
Hytest	30.1	19.5	6.69	4.57
Jerry	28.6	18.0	6.45	6.47
Marion	29.3	17.4	8.05	5.18
Triple Crown	28.3	17.7	6.81	5.63
Youngs	33.3	19.4	7.18	6.28
Morton	**29.1**	**18.8**	**6.32**	**4.8**

Table 7. Comparison of crown rust seedling infection type (IT) of Morton and HiFi with selected oat genotypes after inoculation with crown rust isolate CR 230.

Genotype	Crown Rust Seedling IT[a]	
	Rep 1	Rep 2
Brawn	4	4
Ebeltoft	4	4
Hytest	4	4
Jerry	4	4
Jud	4	4
Killdeer	4	4
Otana	4	4
Troy	4	4
Whitestone	4	4
Youngs	4	4
HiFi	2	2
Morton	;	;

[a] Seedlings inoculated with crown rust isolate and scored according to IT defined by Murphy (1935).

REPRODUCE LOCALLY. Include form number and edition date on all reproductions. FORM APPROVED - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued *(7 U.S.C. 2421)*. The information is held confidential until the certificate is issued *(7 U.S.C. 2426)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
NDSU Research Foundation	ND941119	'Morton'
4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	**5. TELEPHONE** *(Include area code)*	**6. FAX** *(Include area code)*
PO Box 5002 1735 NDSU Research Park Drive Fargo, ND 58105-5002	(701) 231-8931	(701) 231-6661
	7. PVPO NUMBER	200300192

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain.** ☑ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? **If no, give name of country.** ☑ YES ☐ NO

10. Is the applicant the original owner? ☐ YES ☑ NO **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?
☑ YES ☐ NO **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?
☑ YES ☐ NO **If no, give name of country**

11. Additional explanation on ownership *(Trace ownership from original breeder to current owner. Use the reverse for extra space if needed)*:

See additional exhibit E Statement on the Basis of the applicant's ownership incluided in the application.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

18E. Exhibit E. Statement of the Basis of the Owner's Ownership

Dr. Michael S. McMullen, an employee of the North Dakota Agricultural Experiment Station and North Dakota State University is a plant breeder who developed 'Morton' spring oat for which Plant Variety Protection is hereby sought. The employee by agreement and because of the condition of the use of the facilities and funds of the North Dakota Agricultural Experiment Station and North Dakota State University has assigned all ownership rights to Morton oat to the North Dakota Agricultural Experiment Station and the North Dakota State University.

North Dakota State University on behalf of the North Dakota Agricultural Experiment Station has assigned all ownership to the NDSU research Foundation. NDSU/RF is a nonprofit corporation set up to own and manage the intellectual property of North Dakota State University.